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Spherical part of ball end mill with constant tool cutting edge inclination

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Abstract

© TJPRC Pvt. Ltd. The article is devoted to the design of the end radius cutter spherical section. It is proposed to consider the variant with a constant inclination angle of the cutting edge. The obtaining of a constant inclination angle is possible with the transition from a planar Cartesian system to non-Euclidean spaces. The logarithmic spiral has the property of the angle constancy provision between the radius vector and the plane tangent. When it is folded onto the Riemann sphere by the means of affine transformations, the spiral retains this property. Geometrically, this folding represents an inverse stereographic projection. The constant angle of inclination allows you to design the spherical section of the radius cutter with constant cutting angles in a normal section. The design in a normal section is convenient for tool production, and also correlates with the modern theory according to which chips move in the direction normal to the cutting edge of the tool with small deviations. The constancy of the angles in the normal section provides favorable angles in the end section and the section parallel to the axis. The constancy of the angles increases the uniformity of the milling, reducing the cutting forces and increasing the tool life.

Keywords

Cutting edge, End radius cutter, Inclination angle, Logarithmic spiral & sphere, Loxodrome

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